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10/592,959

09/15/2006

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EXAMINER

BUCHANAN, JACOB

ART UNIT

PAPER NUMBER

1795

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/592,959 | <b>Applicant(s)</b><br>TAKEZAWA, HIDEHARU |  |
|                              | <b>Examiner</b><br>Jacob Buchanan    | <b>Art Unit</b><br>1795                   |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 5-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 5-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Amendment*

1. This Office action is responsive to the amendments filed on August 25, 2009 and addresses claims 1, 5-8 and newly added claims 9-12. The claims are newly rejected under 35 USC 102 and 35 USC 103, as necessitated by amendment. Accordingly, this action is made final.

### *Claim Rejections - 35 USC § 102*

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 11-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Kezuka et al. (US 2002/0031710).

Regarding **claims 11-12**, Kezuka discloses a lithium secondary battery (**[0004]**, **[0019]**, **[0021]**, **[0024]** see “occluding and releasing lithium”) comprising:

- A positive electrode (**21**) including a positive electrode active material (**[0021]**)
- A negative electrode (**22**) including a negative electrode active material (**[0025]**)
- And a non-aqueous electrolyte (**[0031]**, and see “plasticizer... propylene carbonate, ethylene carbonate, diethyl carbonate...”, **[0033]**)

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Kezuka additionally discloses said positive electrode active material comprises at least one lithium-containing composite oxide represented by the following general formula:  $\text{Li}_x\text{M}^1_{1-y}\text{M}^2_y\text{O}_2$  **([0022], see  $\text{LiMaO}_2$  wherein Ma is one and more kinds of transitional metals)** where  $\text{M}^1$  and  $\text{M}^2$  are different elements,  $\text{M}^1$  is **Ni** or **Co**,  $\text{M}^2$  is at least one selected from **Ni, Co, Mn**, Mg, and Al,  $1 \leq x \leq 1.05$ , and  $0 \leq y \leq 0.7$  **([0022])**. As Kezuka discloses the use of  $\text{LiCoO}_2$  (wherein  $\text{M}^1 = \text{Co}$ ,  $x = 1$ , and  $y = 0$ ) in the positive electrode material, Kezuka anticipates the recited limitation and chemical **([0058])**.

Kezuka additionally discloses said negative active material comprises at least one selected from the group consisting of **silicon, tin**, a **silicon-containing alloy**, and a **tin-containing alloy** **([0026]-[0027])**.

Kezuka additionally discloses said negative electrode and positive electrode including an organic peroxide, wherein said organic peroxide is at least one selected from the group consisting of **hydroperoxides, peroxyketals**, and ketone peroxides **([0047])**.

To clarify, Kezuka discloses a monomer capable of being radical-polymerized, lithium salt, a plasticizer (wherein the plasticizers are known in the art as non-aqueous electrolytes, [0033]), at least either a carboxylic acid or carboxylate, and a radical-polymerization starting agent to form a mixed-solvent **([0046])**. Examples of the radical-polymerization starting agent include diacylperoxide, peroxycarbonate, peroxyester, **peroxyketal**, dialkylperoxide, **hydroperoxide**, and an azo compound **([0046])**. The separator **(23)** is impregnated with said mixed-solvent, and it is preferable that the

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**positive and negative electrode** mixture layer **(21a, 22a)** be impregnated with said mixed-solvent as well **([0046])**. As Kezuka discloses the impregnation of a separator, **positive** and **negative electrode active material** with a mixed-solvent containing peroxyketal and/or hydroperoxide and therefore the respective electrodes include the recited organic peroxide, the reference anticipates the recited limitations.

***Claim Rejections - 35 USC § 103***

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kezuka et al. (US 2002/0031710).

Regarding **claim 1**, Kezuka discloses a lithium secondary battery **([0004], [0019], [0021], [0024] see “occluding and releasing lithium”)** comprising:

- A positive electrode **(21)** including a positive electrode active material **([0021])**
- A negative electrode **(22)** including a negative electrode active material **([0025])**
- And a non-aqueous electrolyte **([0031], and see “plasticizer... propylene carbonate, ethylene carbonate, diethyl carbonate...”**, **[0033])**

Kezuka additionally discloses said positive electrode active material comprises at least one lithium-containing composite oxide represented by the following general

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formula:  $\text{Li}_x\text{M}^1_{1-y}\text{M}^2_y\text{O}_2$  ([0022], see **LiMaO<sub>2</sub>** wherein **Ma** is one and more kinds of **transitional metals**) where  $\text{M}^1$  and  $\text{M}^2$  are different elements,  $\text{M}^1$  is **Ni** or **Co**,  $\text{M}^2$  is at least one selected from **Ni**, **Co**, **Mn**, **Mg**, and **Al**,  $1 \leq x \leq 1.05$ , and  $0 \leq y \leq 0.7$  ([0022]). As Kezuka discloses the use of  $\text{LiCoO}_2$  (wherein  $\text{M}^1 = \text{Co}$ ,  $x = 1$ , and  $y = 0$ ) in the positive electrode material, Kezuka discloses the recited limitation and chemical ([0058]).

Kezuka additionally discloses said negative active material comprises at least one selected from the group consisting of **silicon**, **tin**, a **silicon-containing alloy**, and a **tin-containing alloy** ([0026]-[0027]).

Kezuka additionally discloses said non-aqueous electrolyte includes an organic peroxide and wherein said organic peroxide is at least one selected from the group consisting of **hydroperoxides**, **peroxyketals**, and ketone peroxides ([0047]).

To clarify, Kezuka discloses a monomer capable of being radical-polymerized, lithium salt, a plasticizer (wherein the plasticizers are known in the art as non-aqueous electrolytes, [0033]), at least either a carboxylic acid or carboxylate, and a radical-polymerization starting agent to form a mixed-solvent ([0046]). Examples of the radical-polymerization starting agent include diacylperoxide, peroxy carbonate, peroxy ester, **peroxyketal**, dialkylperoxide, **hydroperoxide**, and an azo compound ([0046]). The separator (**23**) is impregnated with said mixed-solvent, and it is preferable that the positive and negative electrode mixture layer (**21a**, **22a**) be impregnated with said mixed-solvent as well ([0046]). As Kezuka discloses the impregnation of a separator,

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positive and negative electrode active material with a mixed-solvent containing peroxyketal and/or hydroperoxide, the reference discloses the recited limitations.

While Kezuka discloses the use of an organic peroxide (peroxyketal and hydroperoxide), the reference does not explicitly disclose said organic peroxide accounting for 0.1 to 5% by weight of said non-aqueous electrolyte.

As the rate of polymerization (operating costs) and ionic conductivity are variables that can be modified, among others, by adjusting said weight percent of organic peroxide, with said rate of polymerization and ionic conductivity respectively increasing and decreasing as weight percent of organic peroxide is increased, the precise weight percent of the organic peroxide would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, without showing unexpected results, the claimed weight percent of organic peroxide cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the weight percent of organic peroxide in the apparatus of Kezuka to obtain the desired balance between rate of polymerization and ionic conductivity (*In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980)), since it has been held that where the general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (*In re Aller*, 105 USPQ 223).

Regarding **claim 5**, Kezuka discloses all of the claim limitations as set forth above. Kezuka additionally discloses the secondary battery wherein said organic

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peroxide is further included in said negative electrode ([0046], [0062] see “**negative electrode mixture layer be impregnated with mixed-solvent**”).

Regarding **claim 6**, Kezuka discloses all of the claim limitations as set forth above. Kezuka additionally discloses the secondary battery wherein said negative electrode active material comprises a silicon-containing alloy ([0026]-[0027]).

Regarding **claim 7**, Kezuka discloses all of the claim limitations as set forth above. Kezuka additionally discloses the secondary battery wherein said silicon-containing alloy comprises: a solid solution including silicon and at least one transition metal element including selected from the group consisting of Ti, Ni, Co, Fe, and Cu; or an **alloy** including **silicon** and at least one intermetallic compound selected from the group consisting of **TiSi<sub>2</sub>**, TiSi, **CoSi<sub>2</sub>**, CoSi, **FeSi<sub>2</sub>**, FeSi, **NiSi<sub>2</sub>**, NiSi, and Cu<sub>3</sub>Si ([0027]).

Regarding **claim 8**, Kezuka discloses all of the claim limitations as set forth above. Kezuka additionally discloses the secondary battery wherein said intermetallic compound is **TiSi<sub>2</sub>** ([0027]).

Regarding **claims 9-10**, Kezuka discloses all of the claim limitations as set forth above. Kezuka additionally discloses the secondary battery wherein said organic peroxide is further included in said positive electrode ([0046], [0062] see “**positive electrode mixture layer... impregnated with mixed-solvent**”).



***Response to Arguments***

6. Applicant's arguments filed on 8/25/2009 with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Buchanan whose telephone number is (571)270-1186. The examiner can normally be reached on Monday - Thursday 7:30-5:00 and alternating Fridays 7:30-4:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on (571)272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. B./  
Examiner, Art Unit 1795

/Basia Ridley/  
Supervisory Patent Examiner, Art Unit 1795